netic susceptibility of the samples was studied by Faraday's method in fields of 8100-3600 Oe in the 78-460°K range. The paramagnetic component of the susceptibility of nickel was calculated. The Curie-Weiss law obtains above 290°K; below this temperature, the $1/\chi$-T curve is S-shaped, and the temperature range in which the change in the shape of the curve occurs is independent of the composition of the solid solution (see fig.1).

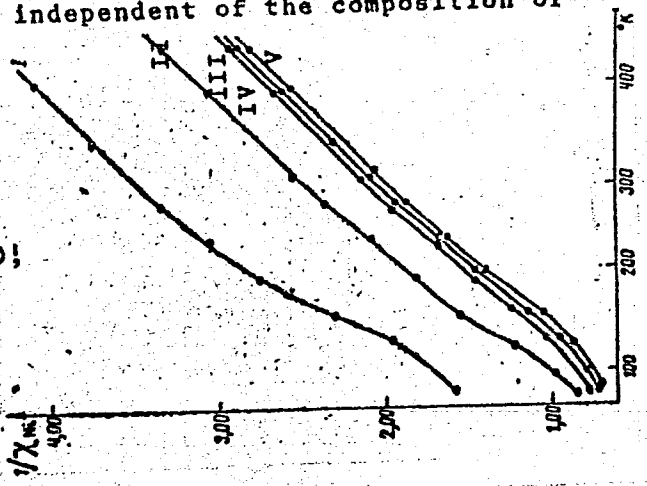

Fig. 1. Temperature dependence of $1/\chi_{Ni}$ (χ_{Ni} is the paramagnetic component of the susceptibility of nickel per gram atom). I--for composition $Ni_{0.199}Mg_{0.801}O$; II--$Ni_{0.052}Mg_{0.948}O$; III--$Ni_{0.039}Mg_{0.961}O$; IV--$Ni_{0.026}Mg_{0.974}O$; V--$Ni_{0.013}Mg_{0.987}O$.

L 14210-66
ACC NR: AP6003617

2

The EPR spectrum consists of a single band whose g factor remains unchanged (equal to 2.22) both above and below this temperature range. The effective magnetic moments calculated for the 290-460°K range (where the Curie-Weiss law applies) depend on the composition of the solid solutions, and substantially exceed the spin magnetic moments for $3d^6$. The x-ray analysis was performed by I. I. Kozhina, and the EPR spectra were studied by S. A. Akopyan, both of whom are thanked by the authors. Orig. art. has: 3 figures.

SUB CODE: 20/ SUBM DATE: 12Apr65/ ORIG REF: 005/ OTH REF: 009

TS

Card 3/3

L 21230-66 EWT(m)/T/EWP(t) IJP(c) JD/HW

ACC NR: AP6003806 SOURCE CODE: UR/0181/66/003/001/0260/0262

AUTHORS: Ariya, S. M.; Lukinykh, N. L.

ORG: Leningrad State University (Leningradskiy gosudarstvennyy universitet)

TITLE: Magnetic properties of NiO-MgO solid solutions

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 260-262

TOPIC TAGS: nickel compound, magnesium compound, inorganic oxide, chemical bonding, solid solution, magnetic susceptibility

ABSTRACT: The purpose of the investigation was to determine the manner in which atoms of different metals are distributed in solid solutions of oxides, with NiO-MgO solid solutions as the specific object of investigation. Since earlier experiments (ZhNKh v. 9, 1525, 1964) have disclosed strong bonds between nickel atoms in the lattice of nickel oxide and in other nickel compounds, it was expected that even in dilute solutions of NiO in MgO the nickel atoms should not be randomly distributed but should exhibit certain aggre-

Card 1/2

L 21230-66
ACC NR: AP6003806

gation properties. The solid solutions were prepared by prolonged roasting at 1100C of a dry residue of evaporation of a solution containing nitrates of nickel and magnesium in the prescribed ratio. The composition was monitored by chemical analysis and by x ray diffraction. The magnetic susceptibility was determined by the Faraday method in fields 8100 -- 3600 Oe in the interval 78 -- 460K. The concentration dependence of the paramagnetic component of the susceptibility was found to exhibit an unusual variation, decreasing slowly at first with increasing NiO concentration, then rapidly (above 4 per cent) and then again slowing down. This behavior is related to aggregation of nickel atoms and the deviation of their distribution from the random law. Although collective interactions can also cause a similar phenomenon, it is concluded that the main mechanism causing the decrease in susceptibility is the aggregation of the nickel atoms, as a result of the strong binding between them. Orig. art. has: 2 formulas, 1 figure, and 1 table.

SUB CODE: 20/ SUBM DATE: 29Jul65/ ORIG REF: 003/ OTH REF: 003

Card 2/2 dda

LUKIANYKH, V., mayor

We shouldn't forget the strict requirements of the Communist Youth League. Komm. Vooruzh. Sil 1 no.1:71-74 O '60. (MIRA 14:7)

(Military discipline)

LUKIRSKIY, A. P.

"Vacuum X-Ray Spectrograph With a Geiger Counter for Investigating the Electrical Levels in Solid Bodies." Cand Phys-Math Sci, Leningrad Order of Lenin State U imeni A. A. Zhdanov, Leningrad, 1955. (KL, No 12, Mar 55)

SO: Sum. No. 670, 29 Sep 55—Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (15)

PA - 2594

AUTHOR: LUKIRSKIY,A.P.

TITLE: The Vacuum X-Ray Spectrograph with Geiger Counter for Research in Power Levels of Solid Bodies. (Vakuumnyy rentgenovskiy spektrograf so schetschikom geygera dlya issledovaniya energeticheskikh urovney v tverdykh telakh, Russian)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 3, pp 328 - 333 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 6 / 1957

ABSTRACT: Lecture delivered at the All-Union Conference for Semiconductors in November 1955 at Leningrad. The emission stripes of light metals were successfully investigated by means of focussing diffraction lattices in the high vacuum. Reliable estimates on emission spectra are, however, lacking for medium and heavy elements. A description is given of a device by means of which such data can be obtained. The gliding angle of inclination was chosen here with $2,5^{0}$, a lever system was used as kinematic system, and X-ray radiation was registered by means of a specially constructed Geiger counter of 30 mm length. The device registers within the domain of waves of from about 20 up to 120 Å. A method was worked out for the investigation of the electron structure of solids where the recorded lead lines were badly reproduced buth those of Sb_2S_3 were very good.

Card 1/2

PA - 2594

The Vacuum X-R_ay Spectrograph with Geiger Counter for Research in Power Levels of Solid Bodies.

When the works by J.L.Rogers, F.C.Chalklin in Proc.Phys.Soc.B., 1954, 67, 412, 348 were published in April 1954, these works were already concluded.
5 illustrations and 1 citation from a Slav publication)

ASSOCIATION: Not given.
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress.

Card 2/2

SOV/51-6-5-20/34

23(5), 21(8)
AUTHORS: Lukirskiy, A.P. and Karpovich, I.A.

TITLE: Determination of the Absolute Sensitivity of Some Photographic Materials to Ultra-Soft X-Radiation (Opredeleniye absolyutnoy chuvstvitel'nosti nekotorykh fotomaterialov k ul'tramyagkomu rentgenovskomu izlucheniyu)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 5, pp 685-687 (USSR)

ABSTRACT: Ultra-soft X-rays are strongly absorbed by many substances and, therefore, special photographic materials are required to record them. The present paper reports some work on the absolute sensitivity of certain photographic materials irradiated with X-rays of wavelengths 23.6 ($O_{K\alpha}$), 44 ($C_{K\alpha}$), 67 ($B_{K\alpha}$) and 113 Å ($Be_{K\alpha}$). A vacuum X-ray monochromator with a diffraction grating, described by Lukirskiy et al (Ref 1), was used to produce a beam which fell on to a photographic plate or film. The beam intensity (10^6 quanta/sec) was previously measured by means of a Geiger counter with an attenuator in front of it. The periods of irradiation of the photographic materials were varied from 10 sec to 2 hours. The materials used were: spectroscopic plates No 3, special NIKFI films and Schumann plates. Blackening curves (optical density D v. log N, where N is the number of quanta received by each $1mm^2$ of the plate or film) are shown in Figs 1, 2, 3 for the above three materials. The

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Determination of the Absolute Sensitivity of Some Photographic Materials to Ultra-Soft X-Radiation

separate curves in each of the figures represent the results obtained at various X-ray wavelengths listed above. Fig 1 shows that with increase of the X-ray wavelength the blackening curves are shifted towards higher values of N, i.e. the sensitivity of the spectroscopic plates No 3 falls with increase of wavelength. The curve for the 44 Å wavelength is an exception to this rule, because this wavelength is least absorbed by gelatine. The sensitivity of the NIKFI films is practically the same for X-rays of 23.6, 44 and 113 Å wavelengths (Fig 2). A table on p 687 gives the values of N corresponding to D = 0.2. These values can be regarded as the absolute sensitivities of the photographic materials studied here to ultra-soft X-rays. These sensitivities are of the order 10^7-10^8 quanta/mm^2 for the three photographic materials mentioned above. There are 3 figures, 1 table and 1 Soviet reference.

SUBMITTED: July 31, 1958

Card 2/2

S/120/60/000/005/015/051
E032/E514

AUTHORS: Rumsh, M.A., Lukirskiy, A.P., Karpovich, I.A. and Shchemelev, V.N.

TITLE: Vacuum X-ray Monochromator for the Determination of the Absolute Efficiencies of Radiation Detectors

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No.5, pp.67-73

TEXT: The monochromator described in the present paper is based on the Bragg spectrometer and hence the working wavelength range is limited on the long wavelength side at 19.3 Å when a mica crystal is employed. The absolute determination of the sensitivities of various detectors of ultra-soft X-ray radiation was described in previous papers by this group (Refs. 1 and 2). The present paper describes an extension of this work to the wavelength region 19.3-1 Å. The absolute intensities of the monochromatized beams are measured by a Geiger-counter of special design. The various characteristic X-ray lines are produced by a special demountable X-ray tube built into the monochromator. Mechanical details of the design of the monochromator are given, together with some typical results obtained for the $K_{\alpha 1,2}$ doublet of Cu. These

S/120/60/000/005/015/051
E032/E514

Vacuum X-ray Monochromator for the Determination of the Absolute Efficiencies of Radiation Detectors

are shown in Fig.4. From the knowledge of the various transmission coefficients of the apparatus it was possible to measure the absolute intensity of the monochromatized beams and this in turn enabled a determination to be made of the efficiency of photomultipliers with different photocathodes as detectors of X-ray radiation. Further details will be reported in a future paper. Acknowledgments are made to A. A. Lebedev for discussions and interest. There are 4 figures and 7 references: 3 Soviet, 1 German and 3 English.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet
(Leningrad State University)

SUBMITTED: September 10, 1959

Card 2/2

LUKIRSKIY, A.P.; OMEL'CHENKO, Yu.A.

Use of the phenomenon of "total external reflection" in the filtration of the continuous spectrum in the region of ultrasoft X radiation. (MIRA 13:11)
Opt. i spektr. 8 no.4:563-568 Ap '60.
(X-ray spectroscopy)

9.6150

S/051/60/009/004/015/034
83919
E201/E191

AUTHORS: Lukirskiy, A.P., Rumsh, M.A., and Smirnov, L.A.

TITLE: A Monochromator for Very Soft X-rays which can be Used to Count the Absolute Number of Quanta

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, No 4, pp 505-510

TEXT: The authors describe a vacuum X-ray monochromator with a diffraction grating suitable for use at wavelengths between 15 and 120 Å. Its construction is shown schematically in Fig 1, where S is an entry slit, D is a disphragm, P is a diffraction grating, S_n is a receiver slit, C_u is a Geiger counter, n is a platform, S_p is a dividing slit; T is an X-ray tube, A is its anode and K is the cathode. Methods of adjustment of the monochromator and of monochromacity stabilization are described. To illustrate the results obtainable with the monochromator, Fig 3 gives the characteristic K-lines of fluorine, oxygen, carbon, boron and beryllium; their wavelengths ranged from 18.3 to 113 Å. The authors describe also a technique for absolute counting of X-ray quanta by means of a Geiger counter

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83919

S/051/60/009/004/015/034
E201/E191

A Monochromator for Very Soft X-rays which can be Used to Count the Absolute Number of Quanta

(the counter is shown schematically in Fig 4). The power supply and counting circuits are given in Fig 3.
Acknowledgement is made to A.A. Lebedev for his advice.
There are 5 figures and 6 references: 3 Soviet, 2 English and 1 translation into Russian.

SUBMITTED: January 26, 1960

Card 2/2

83920
S/051/60/009/004/016/034
E201/E191

9.6150

AUTHORS: Lukirskiy, A.P., Rumsh, M.A., and Smirnov, L.A.

TITLE: Measurement of the Photoelectric Yield of Very Soft X-ray Radiation

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, No 4, pp 511-515

TEXT: The authors describe a technique of measuring the photoelectric yield of very soft (23-113 Å) X-ray radiation. Photocurrents were measured with an Allen-type photomultiplier (Ref 1) which could count single photoelectrons. The power supply and recording circuits of the Allen multiplier are shown in Fig 1. The authors give also dependences of the recorded number of photoelectrons on the amplification factor of a wide-band amplifier used in conjunction with the multiplier (Fig 2), on the voltage between the photocathode and the second dynode (Fig 3), and on the location of the point of incidence of a monochromatic beam on the photocathode (Fig 4). The absolute number of the X-ray quanta was counted with a Geiger counter. The photoelectric yields, obtained for Be, Ni, W, LiF, NaF, CaF_2, SrF_2 and NaCl, are listed in a table on p 515. The yields ranged from 0.7% for Be subjected to X-rays of 23.6 Å wavelength to 27% for NaCl

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83920

S/051/60/009/004/016/034
E201/E191

Measurement of the Photoelectric Yield of Very Soft X-ray Radiation

subjected to 113 Å X-rays. The yields rose with increase of the X-ray wavelength.
Acknowledgement is made to A.A. Lebedev for his advice.
There are 4 figures, 1 table and 15 references: 2 Soviet, 11 English and 2 Indian.

SUBMITTED: January 26, 1960

Card 2/2

9.6150

S/051/60/009/005/012/019
E201/E191

AUTHORS: Lukirskiy, A.P., Rumsh, M.A., and Karpovich, I.A.

TITLE: Measurement of the Photoelectric Emission Yield for 1.54-13.3 Å X-rays

PERIODICAL: Optika i spektroskopiya, 1960, Vol.9, No.5, pp 653-657

TEXT: In an earlier paper (Ref. 1) the authors described a technique of measuring the photoelectric yield of ultrasoft X-rays by determination of the intensity of X-rays with a Geiger counter and the number of photoelectrons with an Allen-type electron multiplier (Ref. 2). The present paper describes the use of this technique for X-rays of λ = 1.54-13.3 Å. A vacuum X-ray monochromator (Ref. 3) was employed; it is shown schematically in Fig. 1. Dependence of the counting rate of an Allen-type electron multiplier on the amplification factor of the electronic circuit, on the place where the X-ray beam fell on the multiplier photocathode, and on the voltage between the photocathode and the first dynode, is given in Figs 2, 3 and 4 respectively. The photoelectric yields were found for Ti, W, Pt, NaBr, CsI and SrF_2; they are listed (in %) in a table on

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84691

S/051/60/009/005/012/019
E201/E191

Measurement of the Photoelectric Emission Yield for 1.54-13.3 Å X-rays

page 657. The photoelectric yield generally tended to rise with increase of the X-ray wavelength. Ionic crystals had usually much greater photoelectric yields than metals.
There are 4 figures, 1 table and 5 Soviet references.

SUBMITTED: January 26, 1960

Card 2/2

84661

9.6150
26.1512

S/020/60/135/001/014/030
B006/B056

AUTHORS: Rumsh, M. A., Lukirskiy, A. P., and Shchemelev, V. N.

TITLE: The Photoeffect From Metallic Cathodes in the Wavelength Region of From 1.39 to 13.3 A

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 1, pp. 55-57

TEXT: By means of a method described already earlier (Refs. 1, 2), the authors investigated the dependence of the quantum yield $\varkappa$ on the glancing angle θ of W-, Ni-, and Be-photocathodes in the range of 1.39-13.3 A. It was found experimentally that the quantum yield decreases rapidly with a decrease of the glancing angle; this function may well be approximated in the case of small θ by a cosec θ function. Fig. 1 shows $\varkappa \sin\theta = f(\theta)$. In the case of very small angles (up to 3^0), the rapid decrease of the curves may be explained by the total reflection of X-ray radiation. All curves have a tendency toward a decrease of $\varkappa \sin\theta$ with a decrease of θ of from $10 - 15^0$ to $2 - 3^0$. The effects observed may be explained by assuming that, as a result of the absorption of the radiation energy in metal,

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The Photoeffect From Metallic Cathodes in the Wavelength Region of From 1.39 to 13.3 A

S/020/60/135/001/014/030
B006/B056

"free" electrons occur, which move with a velocity that is sufficient to overcome the work function. In a layer of the thickness dx, the energy $dE = I(\mu/\sin\Theta)dx$ is absorbed per time unit, and leads to the occurrence of $dn = dE/\varepsilon$ "free"electrons. ($I = N_0(hc/\lambda)[1-R(\Theta)]\exp(-\mu x/\sin\Theta)$). $R(\Theta)$ - reflection coefficient, μ - linear attenuation factor; $I_0 = N_0 hc/\lambda$ - intensity of the incident beam, N_0 - number of the incident quanta per sec, λ - wave length, ε - the energy necessary for the forming of one "free" electron. For the quantum yield the following formula is obtained: $\varkappa = \frac{hc}{\varepsilon\alpha}\frac{\mu}{\lambda}\left[1-R(\Theta)\right]\operatorname{cosec}\Theta\frac{\alpha}{\alpha+\mu/\sin\Theta}$. For X-rays, $R(\Theta) = 0$, with the exception of very small Θ, where total reflection occurs. The factor $\alpha/(\alpha+\mu/\sin\Theta)$ differs only little from unity. Small angles excepted, it is possible to put $\varkappa = (hc/\varepsilon\alpha)(\mu/\lambda)\operatorname{cosec}\Theta$; (this relation holds for $\Theta \geqslant 10 - 15^{\circ}$). The numerical results of measurements are given in a table. In the spectral range investigated here, $\varkappa = k\lambda^2$. Fig. 3 shows $\log\varkappa = f(\log\lambda)$ (experimentally). The linear course of this function and the angle of inclination confirm the assumption made concerning the nature of the effects observed. The authors finally thank Academician

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The Photoeffect From Metallic Cathodes in the Wavelength Region of From 1.39 to 13.3 A

S/020/60/135/001/014/030
B006/B056

A. A. Lebedev for his interest and discussions. There are 3 figures and 6 references: 3 Soviet, 2 German, and 1 US.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: June 11, 1960, by A. A. Lebedev, Academician

SUBMITTED: May 26, 1960

Card 3/5

84661

S/020/60/135/001/014/030
B006/B056

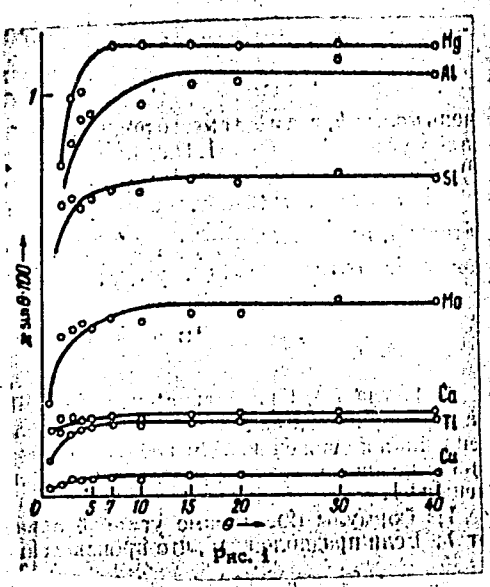
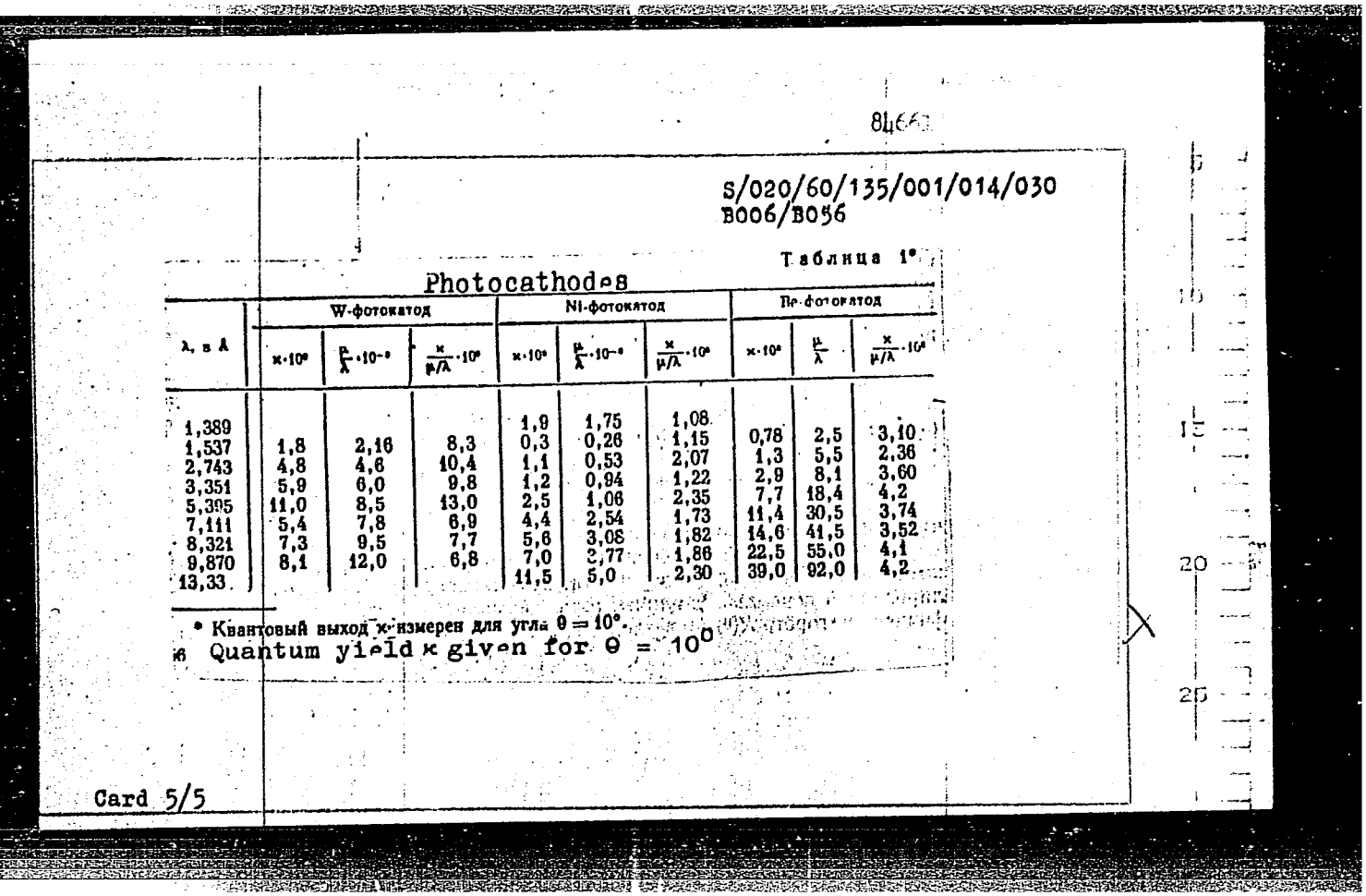


Рис. 1

Card 4/5



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B006/B056

Таблица 1*

Photocathodes

λ, в Å	W-фотокатод			Ni-фотокатод			Pt-фотокатод		
	$\varkappa \cdot 10^6$	$\frac{\mu}{\lambda} \cdot 10^{-6}$	$\frac{\varkappa}{\mu/\lambda} \cdot 10^6$	$\varkappa \cdot 10^6$	$\frac{\mu}{\lambda} \cdot 10^{-6}$	$\frac{\varkappa}{\mu/\lambda} \cdot 10^6$	$\varkappa \cdot 10^6$	$\frac{\mu}{\lambda}$	$\frac{\varkappa}{\mu/\lambda} \cdot 10^6$
1,389				1,9	1,75	1,08			
1,537	1,8	2,16	8,3	0,3	0,26	1,15	0,78	2,5	3,10
2,743	4,8	4,6	10,4	1,1	0,53	2,07	1,3	5,5	2,36
3,351	5,9	6,0	9,8	1,2	0,94	1,22	2,9	8,1	3,60
5,395	11,0	8,5	13,0	2,5	1,06	2,35	7,7	18,4	4,2
7,111	5,4	7,8	6,9	4,4	2,54	1,73	11,4	30,5	3,74
8,321	7,3	9,5	7,7	5,6	3,08	1,82	14,6	41,5	3,52
9,870	8,1	12,0	6,8	7,0	2,77	1,86	22,5	55,0	4,1
13,33				11,5	5,0	2,30	39,0	92,0	4,2

* Квантовый выход $\varkappa$ измерен для угла $\theta = 10°$.

* Quantum yield $\varkappa$ given for $\theta = 10^0$

Card 5/5

LUKIRSKIY, A.P.; RUMSH, M.A.

Efficiency of X-ray radiation registration with industrial Geiger counters. Prib.i tekh.eksp. 6 no.5:176-177 S-O '61. (MIRA 14:10)

1. Leningradskiy gosudarstvennyy universitet.
(Geiger-Müller counters—Testing)

LUKIK I, A.P.

Using X-ray bremsstrahlung spectra for the study of absorption spectra in the ultrasoft region. Izv. AN SSSR. Ser. fiz. 25 no.8:910-912 Ag '61. (MIRA 14:8)

1. Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta im. A.A. Zhdanova.
(X rays--Spectra)
(Absorption spectra)

LUKIRSKIY, A.P.

Spectrometer for ultrasoft X rays with total recording of the radiation by means of secondary electron multipliers and a Geiger counter. Izv. AN SSSR. Ser. fiz. 25 no.8:913-918 Ag '61. (MIRA 14:8)

(X-ray spectroscopy)

RUMSH, M.A.; LUKIRSKIY, A.P.; SHCHEMELEV, V.N.

Using secondary-electron amplifiers for studying soft X-ray spectra. Izv. AN SSSR. Ser. fiz. 25 no.8:1060-1065 Ag '61. (MIRA 14:8)

1. Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta im. A.A. Zhdanova.
(X-ray spectroscopy)
(Amplifiers(Electronics))

RUMSH, M.A.; SHCHEMELEV, V.N.; LUKIRSKIY, A.P.

Quantum sensitivity of photographic materials to X rays ranging from 1.54 to 113 °. Izv. AN SSSR. Ser. fiz. 25 no.8:1066-1068 Ag '61. (MIRA 14:8)

1. Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta im. A.A. Zhdanova.
(Photographic sensitometry)
(X rays)

LUKIRSKIY, A. P. and OMEL'CHENKO, Yu. A.(USSR)

"Ultra-soft X-ray reflections and related work"

report to be submitted for the 1st Intl. Conference on Ultraviolet Vacuum Radiation Physics.
University of Southern California
16-19 April 1962

LUKIRSKIY, A. P.; SAVINOV, Ye. P.

Monochromator with a rotating diffraction grating for ultrasoft X radiation. Opt. i spektr. 13 no.6:846-848 D '62. (MIRA 16:1)

(Monochromator) (X rays)

LUKIRSKIY, A. P., RUMSH, Mikhail A. and SMIRNOV, L. A.

"Instrumentation Between 13A and 120A"

report to be submitted for the 1st Intl. Conference on Ultraviolet Vacuum Radiation Physics.
University of Southern California
16-19 April 1962

S/032/63/029/004/014/016
A004/A127

AUTHORS: Lukirskiy, A.P., Rumsh, M.A., Karpovich, I.A.

TITLE: Geiger counters for recording soft and ultrasoft x-radiation

PERIODICAL: Zavodskaya laboratoriya, no. 4, 1963, 495 - 496

TEXT: The authors describe their design of special Geiger counters for the recording of radiation of a wave length in the ranges of 23.6 -280 Å and 1.5 - 18.3 Å. The counters are of a coaxial design with a narrow lateral window located on the generatrix. Such an arrangement of the inlet window precludes the phenomenon of a counter "dead zone". The counter cathode is made of red copper and pickled in the nitric acid. By two hoses the counters are connected to a special layout ensuring a forced circulation of the gas mixture in the counter, which results in a considerable reduction of the setup time of the stationary counter characteristics. The counters are filled with an argon-alcohol mixture. The efficiency-wave length of the Geiger counter is given. There are 3 figures.

ASSOCIATION: Leningradskiy gosudarstvenny universitet im. A.A. Zhdanova (Leningrad State University im. A.A. Zhdanov)

Card 1/1

S/051/63/014/002/016/026
E039/E120

AUTHORS: Lukirskiy, A.P., and Savinov, Ye.P.

TITLE: The use of diffraction gratings and echelettes in the ultra-soft X-ray region

PERIODICAL: Optika i spektroskopiya, v.14, no.2, 1963, 285-294

TEXT: Diffraction gratings and echelettes cut in glass are investigated with the object of finding the optimum conditions for their use. All the gratings and echelettes have 600 lines/mm and were made in the Gosudarstvennyy opticheskiy institut (State Optical Institute). Coefficients of reflection are determined for monochromatic lines at 23.6, 34.4, 44, 67 and 113 Å. The theory of reflection from gratings and echelettes is developed and compared with experimental results. It is shown that while the optimum conditions for ruling a grating or echelette for a particular wavelength can be calculated, if the coefficient of reflection is required over a wide range of wavelengths it must be determined experimentally. Echelettes give a lower reflection coefficient than gratings for wavelengths less than 60 Å while for wavelengths greater than 100 Å the converse is true.

The use of diffraction gratings ... S/051/63/014/002/016/026
E039/E120

There are 8 figures and 2 tables.

SUBMITTED: March 16, 1962

Card 2/2

S/051/63/014/002/017/026
E039/E120

AUTHORS: Lukirskiy, A.P., and Savinov, Ye.P.

TITLE: The reflection of ultra-soft X-rays from glass and titanated surfaces

PERIODICAL: Optika i spektroskopiya, v.14, no.2, 1963, 295-298

TEXT: The object of coating a glass surface with a metallic layer is to exclude fine structure arising on reflection. Ti was found to be superior to Cr and Au in this respect. The absorption edge for Ti is located at 27.29 Å, hence for wavelengths greater than 30 Å fine structure in the reflection coefficient is excluded. The reflection coefficient was determined for a glass mirror (glass Ф-1 (F-1) on which diffraction gratings are cut) and also for a Ti surface, prepared by evaporation in a vacuum. The apparatus used consisted of a monochromator, goniometric apparatus for obtaining reflection at different angles, and two Geiger counters; one for recording the intensity of incident radiation and the other for the reflected radiation. An X-ray tube was used as a source and the measurements were made at wavelengths corresponding to the K series of O, N, C, B, and Be at

23.6, 31.4, 44, 67 and 113 Å respectively. For all wavelengths except 31.4 Å a larger reflection coefficient is observed for the Ti surface than for glass. The fall in reflection coefficient at 31.4 Å is due to the proximity of the absorption edge. It follows that coating a grating with Ti will exclude fine structure in its reflection coefficient for wavelengths greater than ~30 Å without detracting from its performance as a grating and will also increase its reflection coefficient.
There are 4 figures.

SUBMITTED: March 16, 1962

S/048/63/027/003/005/025
B108/B114

AUTHORS: Lukirskiy, A. P. and Zimkina, T. M.

TITLE: Fine structure of the $L_{II,III}$ absorption edge of argon

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 3, 1963, 324-329

TEXT: The absorption spectrum of argon was measured with a spectrometer (A. P. Pukirskiy, Izv. AN SSSR. Ser. fiz., 25, no. 8, 913 (1961)) plus Geiger counter after the Brogren method (Nova acta Regia soc. Scient. Upsalensis, 14, no. 4 (1949)) turned out to involve too much background. The curves of μ/ϱ versus wavelength (energy), taken at various pressure had all the same character except for an absorption intensity redistribution due to the scattering background of the spectrometer. Results of measurements at an argon pressure of 10 mm Hg are presented in Fig. 4. The experimental curve 1 was corrected for instrument distortions, which led to curve 2. The variation of the absorption coefficient with consideration of the possible statistical fluctuations is shown in the region of the maximum C (shaded area). The s- and d-series of the optical levels

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Fine structure of the ...

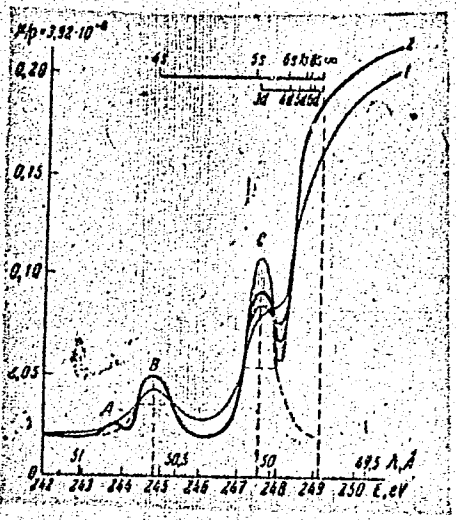
of potassium are shown at the top of the figure. The B maximum is attributed to transition from the $L_{II,III}$ levels to the 4s-state, the C maximum to transition to the 3d- and 5s-states. According to the form of the B and C maxima, the width of the $L_{II,III}$ levels is 1 ev. The position of the fundamental absorption edge, as determined from the end of the series, is 249.5 ev. There are 4 figures and 1 table.

ASSOCIATION: Fizicheskiy fakul'tet Leningradskogo gos. universiteta im. A. A. Zhdanova (Physics Division of Leningrad State University imeni A. A. Zhdanov)

Fine structure of the...

S/048/63/027/003/005/025
B108/B114

Fig. 4



Card 3/3

S/048/63/027/003/006/025
B117/B234

AUTHORS: Lukirskiy, A. P., and Zimkina, T. M.

TITLE: M-series of Zr, Nb and Mo, and M-emission bands of Nb and Mo

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 3, 1963, 330 - 339

TEXT: In the course of studying the work performed by the spectrometer described earlier (A. P. Lukirskiy, Izv. AN SSSR, Ser. fiz., 25, 8, 513 (1961)) and determining the "instrumental distortions" occasioned by that apparatus as well as the absolute intensities in the spectra, it was found possible to determine the natural widths of certain lines in the M-spectra of Zr, Nb and Mo along with their relative intensities. For the purpose of determining the "instrumental distortions" the strongest M_ζ lines of the Mo and Nb in the 1st, 3rd and 5th order and those of Zr in the 1st and 3rd order were examined. To establish the curve of "instrumental distortions", curves of the M_ζ lines were compared with the dispersion form: they were found to agree, which justifies the conclusion that the "instrumental distortions" too have a dispersion form. The curves indicate a width of 0.094 Å which is close to the calculated value of $\Delta\lambda_{min}$ = 0.092 Å. After

making the appropriate corrections for the "instrumental distortions" the following natural widths of lines in the M series were found:

	Zr		Nb		Mo	
	relative intensity %	width Å	relative intensity %	width Å	relative intensity %	width Å
$M_{IV,V}$-Y_{II}	2.3(4)	-	6.5(0)	-	9.5(3)	-
$M_{IV,V}$-Y_{I}	1.3(2)	0.60	2.1(5)	0.64	1.2(2)	0.58
M_{II}-M_{IV}	1.1(3)	0.64	-	-	0.85(2)	0.76
M_{III}-$M_{IV,V}$	-	-	1.9(0)	0.80	2.5(3)	0.96
$M_{IV,V}$-$N_{II,III}$ (M_ζ)	100(5)	0.420	100(0)	0.505	100(5)	0.501

Except for the emission bands (transition to Y_{II}) all the lines have a dispersion form. Examination of the Nb and Mo emission bands showed that these were similar to one another. They result from the superposition of two bands mutually displaced by about 3 ev and with an intensity ratio of 1 : 7.

M-series of Zr, Nb and Mo, and...

Both bands have strongly marked short-wave edges of the same width. This suggests that in the emission transition from $M_{IV,V}$ only the M_V level occurs, the weak emission band on the short-wave side being presumably a short-wave satellite as in the case of $L_{II,III}$Mg (Rentgenovskiye luchi (X-rays) Sb. statey pod red. M. A. Blokhina, Part III, p. 356, IL, M., 1960). The emission bands have a slowly increasing long-wave part joining into a "long-wave tail", a steeply dropping short-wave part which is characteristic of metals and a bulge in the middle part of the curve. The last mentioned feature is evidence of a complex structure in the zone, whose width was determined as 4.25 ev. The position of the short-wave edge is 206.7 ev which corresponds with the M_V energy level as calculated from the Fermi edge and agrees well with tabulated data for the normal level (208 ev). The following values were found for the natural widths of the $N_{II,III}$ level:

$$\Gamma_{N_{II,III}}\text{Nb} = 1.19 \text{ ev} - (0.2 \pm 0.1) = (1 \pm 0.1) \text{ ev};$$
$$\Gamma_{N_{II,III}}\text{Mo} = 1.49 \text{ ev} - (0.5 \pm 0.1) = (1 \pm 0.1) \text{ ev}.$$

There are 6 figures and 4 tables.

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M-series of Zr, Nb and Mo, and...

S/048/63/027/003/006/025
B117/B234

ASSOCIATION: Fizicheskiy fakul'tet Leningradskogo gos. universiteta im A. A. Zhdanova (Department of Physics of the Leningrad State University imeni A. A. Zhdanov)

Card 4/4

S/048/63/027/003/025/025
B106/B238

AUTHORS: Lukirskiy, A. P., Brytov, I. A., and Yershov, O. A.

TITLE: Proportional counter tube for soft X-rays

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 3. 1963, 446-451

TEXT: The authors studied possible uses for a flow proportional counter they had described previously (Ref. 3: Izv. AN SSSR. Ser. fiz., 27, no. 6 (1963)). One drawback to this counter tube was the long preparation time before filling. A much simpler filling process using a thicker, stronger terylene. The gas mixture flows from the reservoir where it is stored under pressure past a needle valve into the counter tube. The gas issuing from the counter passes through an oil trap and escapes into the air. A calcium purifier connected to the pressure reservoir is heated to 250 - 300° C during operation. The mixture is made up of argon and methane. It takes 45 - 60 min after the needle valve has been

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Proportional counter ...

opened until the characteristics of the counter tube reach steady values. The apparatus is then practically ready for use. This simple, reliable filling process is recommended for flow proportional counters in general. The characteristics of the tube remain constant for a flow rate of 1 bubble per 1 - 3 sec in the oil trap. 1 bubble per second corresponds to a gas consumption of about 50 ccl per hr. The gas reservoir lasts about 200 hours. The counter tube can be used to record radiation between 1.54 and 13.3 Å. The maximum gas amplification, which is within the range where the resolution is proportional to the voltage, depends on the counting rate. The limit of the proportionality range is the product ANC_Z, where A is the gas amplification factor, N the primary ionization, and C_Z the counting rate. The maximum value of the product is estimated at $5 \cdot 10^9$. The "plateau" reaches up to 220 v and is practically level (observed with the broad window from Ref. 3). Increasing the area of the window to 1 mm did not decrease the resolution of the counter tube. For

S/048/63/027/003/025/025
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Proportional counter ...

soft rays with wavelengths up to c. 20 Å, the terylene window is replaced by a more transmissive window made of cellulose nitro acetate, and a lower internal pressure is recommended. The operational range of the counter tube can probably be extended by using a thinner terylene window . There are 7 figures.

ASSOCIATION: Fizicheskiy fakul'tet Leningradskogo gos. universiteta im. A. A. Zhdanova (Physics Branch of Leningrad State University imeni A. A. Zhdanov)
Spetsial'noye konstruktorskoye byuro rentgenovskoy apparatury (Special Design Office for X-ray Apparatus)

Card 3/3

L 9834-63 EWA(h)/EPF(c)/EWT(1)/EWT(m)/BDS--AFFTC/ASD/ESD-3/AFWL/AFCRL-2--
Pr-4--RM/WW/MAY

ACCESSION NR: AP3001360 S/0048/63/027/006/0806/0816

AUTHOR: Lukirskiy, A. P.; Yershov, O. A.; Bry*tov, I. A. 19 21 73 70

TITLE: Operation of proportional counters in the ultrasoft x-ray region [Report of the Sixth Conference on X-Ray Spectroscopy held in Odessa from 2 to 16 July 1962]

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v. 27, no. 6, 1963, 806-816

TOPIC TAGS: proportional counters, x-ray detectors

ABSTRACT: A proportional counter was used for the first time for detecting ultrasoft x-radiation in 1960 by J. E. Holliday (Rev. Sci. Instr., 31, 891, 1960 and Philos. Mag.,6, 801, 1961); the counter had an appreciable background and its operation was not studied. The purpose of the present work was to investigate proportional counters as detectors of ultrasoft x-rays and to evaluate their potentialities for this purpose. The test set-up consisted of the proportional counter, a power supply, a preamplifier, a main amplifier, an integral

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L 9834-63
ACCESSION NR: AP3001360

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discriminator, a differential discriminator and two recorders, as well as an oscillograph. The counter was a cylindrical one with provision for metered gas admission. The gases used were pure methane and argon-methane mixtures. Pulse height distributions for different wavelengths were determined (typical curves are reproduced). In tests of the proportional counter as a radiation detector the intrinsic background of the counter did not exceed 10 pulses per min. It is concluded that proportional counters filled with methane or argon-methane can be used as detectors of x-rays at counting rates of up to tens of thousands of pulses per second. Some design recommendations are given. Orig. art. has: 16 equations, 10 figures and 3 tables.

ASSOCIATION: Leningradskiy gosudarstvenny*y universitet im. A. A. Zhdanova, Spetsial'noye konstruktorskoye by rentgenovskoy apparatury* (Leningrad State University; Special X-Ray Appratus Design Bureau)

SUBMITTED: 00 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: PH,SD NR REF SOV: 003 OTHER: 013

ja/ss

Card 2/2

L 9835-63 EWA(h)/EPF(c)/EWT(l)/EWT(m)/BDS—AFFTC/ASD/ESD-3/AFWL—Pr-4—
RM/WW/MAY/IJP(C)
ACCESSION NR: AP3001361 S/0048/63/027/006/0817/0820

AUTHOR: Lukirskiy, A. P.; Zimkina, T. M.

TITLE: Mass absorption coefficients of argon and ethyl alcohol in the ultrasoft x-ray region [Report of the Sixth Conference on X-Ray Spectroscopy held in Odessa from 2 to 16 July 62]

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v. 27, no. 6, 1963, 817-820

TOPIC TAGS: mass absorption coefficients, argon, ethyl alcohol

ABSTRACT: One of the best mixtures for filling gas counters for detecting ultrasoft x-rays is argon plus ethyl alcohol vapor, and for determining the counter efficiency one must know the mass absorption coefficients of the gas, yet the wavelength dependence of the mass absorption coefficients of argon and ethyl alcohol in the ultrasoft x-ray region is inadequately known. The purpose of the present work was to fill this gap. The measurements were carried out with the aid of a special x-ray spectrometer with combined detection in the 250 to 44 Angstrom range and an ultrasoft x-ray monochromator in the 44 to 23 Angstrom

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ACCESSION NR: AP3001361

rang. Both instruments have provision for detection by means of secondary electron multipliers or/and a Geiger counter; for the present measurements the Geiger counter was replaced by a gas cylinder with nitroacetate film windows which passed 80% of the 23 Angstrom and 3% of the 250 Angstrom radiation. The gas pressure was varied to obtain optimum accuracy in determining the mu/rho ratio, which corresponded to 3 to 1 attenuation. The results for argon and ethyl alcohol are presented in the form of curves in log mu/rho versus log lambda coordinated; the values of mu/rho for argon are also tabulated. The locations of discontinuities are noted. For argon the variation of log/rho with log lambda is anomalous: the absorption coefficient decreases with wavelength and the curve has a flat peak in the region of 160 Angstrom; for ethyl alcohol the wavelength variation of the mass absorption coefficient is linear in the entire investigated range. The present data for the 3.86 to 9.87 Angstrom region agree well with the results of B. Woernle (Ann. Phys., 5, 475, 1930) for this wavelength interval. Orig. art. has: 3 equations, 1 figure and 1 table.

Card 2/3

L 9835-63
ACCESSION NR: AP3001361

ASSOCIATION: Leningradskiy gos. universitet im. A. A. Zhdanova (Leningrad State University)

SUBMITTED: 00 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: PH NR REF SOV: 004 OTHER: 004

ja/es
Card 3/3

LUKIRSKIY, A.P.; RUMSH, M.A.; KARPOVICH, I.A.

Measurement of the intensity of soft X rays with the aid of secondary electron multipliers. Zav.lab. 29 no.4:456-459 '63. (MIRA 16:5)

1. Leningradskiy gosudarstvenny, universitet im. A.A.Zhdanova.
(X rays--Industrial applications) (Photoelectric multipliers)

ACCESSION NR: AP4011735 S/0181/64/006/001/0043/0053

AUTHORS: Lukirskiy, A. P.; Bryntov, I. A.

TITLE: Investigation of the energy structure of Be and BeO by ultralongwave x-ray spectroscopy

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 43-53

TOPIC TAGS: energy structure, Be, BeO, x ray spectroscopy, ultralongwave spectroscopy, emission spectrum, absorption spectrum, metallic Be, covalent bond electron, forbidden band, allowed band, valence band

ABSTRACT: The authors have obtained emission and absorption spectra on an x-ray spectrometer for metallic Be, Be in BeO_2 and O in BeO. For Be the 60-140 A interval was examined, for O the 17-25 A interval. The results of their measurements and interpretations are summarized in Figs. 1-7 of the Enclosures. On the emission spectrum metallic Be is defined by the width of the filled part of the valence band. The authors suggest that the filled band in Be is formed by covalent-bond electrons. The K level in BeO is displaced relative to the corresponding level in Be. In seeking to find a connection between quantum yield and absorption

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ACCESSION NR: AP4011735

spectra, the authors conclude that the quantum yield in the wavelength interval investigated is sensitive to the formation of an oxide film on a substance and that this method of preparing the film is therefore inapplicable. Orig. art. has: 9 figures and 3 tables.

ASSOCIATION: Leningradskiy gosudarstvenny*y universitet (Leningrad State University)

SUBMITTED: 22Jun63 DATE ACQ: 14Feb64 ENCL: 07

SUB CODE: PH NO REF SOV: 011 OTHER: 014

Card 2/2

BRYTOV, I.A.; LUKIRSKIY, A.P.

Photoionization cross section of absorption in beryllium. Opt. i spektr. 16 no.2:363 F '64. (MIRA 17:4)

ACCESSION NR: AP4020935 S/0051/64/016/002/0310/0319

AUTHOR: Lukirskiy,A.P.; Savinov,Ye.P.; Yershov,O.A.; Shepelev, Yu.F.

TITLE: Reflection coefficients for radiation with wavelengths of 23.6 to 113 Angstrom for a number of elements and substances and determination of the refraction indices and absorption coefficients

SOURCE: Optika i spektroskopiya, v.16, no.2, 1964, 310-319

TOPIC TAGS: reflection coefficient, absorption coefficient, titanium, beryllium, carbon, aluminum, chromium, gold, silver, germanium, lithium fluoride, magnesium fluoride, strontium fluoride, potassium chloride, polystyrene

ASBTRACT: In view of the interest in reflection of ultrasoft x-radiation from different substances that can be used for coating diffraction gratings and other optical components, in the present study there were determined experimentally the values of the total external reflection coefficient R of Be,C,Al,Ti,Cr,Ge,Ag,Au,LiF, MgF_2,KCl,SrF_2, polystyrene and F-1 type glass as a function of the angle of incidence (mostly glancing angles in the range under 10°) for radiation of wavelengths 23.6, 31.4, 44, 67 and 112 Å. These are the wavelengths of the KX lines of O,N,C,B

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ACCESSION NR: AP4020935

and Be. The measurements were carried out using a modification of the setup and procedure employed earlier (A.P.Lukirskiy and Ye.P.Savinov,Opt.i spektr.,14,295,1963). The materials for the most part were in the form of 1000 Å thick coatings vacuum evaporated onto glass plates; the halide layers were deposited over undercoatings of Al or Au on glass, mainly to provide the requisite conductivity for subsequent absorption measurements. The results for R are presented in the form of curves (R versus angle of incidence) and in a table. The reflection curves were then used for calculating the index of refraction and the absorption coefficient by means of the usual Fresnel formulas; the results are tabulated. To check the validity of the calculations and accuracy of the results, the absorption coefficients of some of the coatings for the same characteristic wavelengths were measured directly by the transmission method. The results are consistent, but the direct absorption values are systematically higher than the values deduced from the reflection curves. A similar divergence was obtained for copper layers by L.G.Parratt (Phys.Rev.,95,359, 1954), who attributed it to decrease in density of the substance with approach to the surface; this is also assumed to be the reason for the divergences observed in the present case. The results are discussed briefly in a final section. Orig.art. has: 17 formulas, 10 figures and 3 tables.

Card 2/3

ACCESSION NR: AP4032874 S/0051/64/016/004/0688/0694

AUTHOR: Lukirskiy, A.P.; Zimkina, T.M.; Bry*tov, I.A.

TITLE: Investigation of x-ray spectra in the wavelength region above 15 Angstrom by means of a spectrometer with a gold coated diffraction grating

SOURCE: Optika i spektroskopiya, v.16, no.4, 1964, 688-694

TOPIC TAGS: x-ray spectroscopy, x-ray diffraction, diffraction grating, coated optics

ABSTRACT: In view of the importance in x-ray spectroscopy of the wavelength region below 40 Å, the present study was devoted to investigation of the distorting effect of a gold coating on an echelette grating. The echelette had 600 lines per mm and a blaze angle of $1^{\circ}15'$; it was coated with a 300 Å thick gold layer and installed in a recording spectrometer, wherein the angle of incidence was $5^{\circ}30'$. This grating had previously been tested by recording monochromatic lines in the 23.6 to 113 Å region (A.P.Lukirskiy, Ye.P.Savinov and Yu.F.Shepelev,Opt.i spektro.15,543,1963). Particular attention was devoted to determining the distorting effect in the region of the absorption edges of gold. The tests and comparisons show that, except in the 33

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to 38 Å region, the absorption edges of gold introduce virtually no noticeable distortion, i.e., that a gold coated echelette can be used for investigating the shape of spectrum lines. In fact, in addition to enhancing the contrast, a gold coating extends the working range of the grating at 5°30' incidence down to about 15 Å. For test purposes some of the emission lines of oxygen and nitrogen in MgO and BN were recorded in the third order; the degree of contrast is excellent. There were also recorded the M_ξ lines of cadmium and silver; as recorded these lines have the classical dispersion shape. Their widths taken from the spectrometer curves are 10.2 and 8.8 eV, which is in agreement with the data in the literature. Orig.art.has: 8 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 24Jun63 DATE ACQ: 07May64 ENCL: 00

SUB CODE: OP NR REF SOV: 007 OTHER: 004

Card 2/2

LUKIRSKIY, A.P.; ZIMKINA, T.M.

$L_{II,III}$ absorption spectra of potassium and chlorine in KCl. Izv. AN SSSR.Ser. fiz. 28 no. 5:765-771 My '64. (MIRA 17:6)

1. Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta.

ACCESSION NR: AP4038775 S/0048/64/028/005/0836/0840

AUTHOR: Zimkina, T.M.; Yershov, O.A.; Lukirskiy, A.P.

TITLE: M Emission bands of zirconium, niobium and molybdenum and some chemical compounds of these elements /Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sep to 1 Oct 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.5, 1964, 836-840

TOPIC TAGS: x-ray spectrum, x-ray emission, zirconium, zirconium compound, niobium, niobium compound, molybdenum, molybdenum compound

ABSTRACT: The M emission bands of Zr, Nb and Mo and their oxides were recorded in continuation of earlier work on the M spectra of these metals (A.P.Lukirskiy and T. M.Zimkina,Izv.AN SSSR,Ser.fiz.27,330,1963). The spectrometer is described elsewhere (A.P.Lukirskiy,Ibid.25,215,1961); it has been equipped with a new gold-plated grating which makes it possible to record N, O and C lines. The oxide spectra were recorded only to assist in estimating the purity of the metal spectra. The Mo_2C spectrum was also obtained, as well as the spectrum of Nb containing 12.44% N. When the anode was operated cool (3 kV, 12 to 20 mA on the x-ray tube) lines of C, O and N

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ACCESSION NR: AP4038775

were present and the M emission band of each metal had a double peak. When the anode was operated sufficiently hot (45 to 100 mA, temperature greater tha 1000°C) the C, O and N lines disappeared along with the double peaks. The double peak structure was traced to carbon contamination, and the Mo_2C spectrum was found to have this double peaked shape. The M emission bands of Nb and Mo showed the bends reported in the earlier paper of this series (loc.cit.supra); that of Zr was simple. The simpler structure of the Zr band is ascribed to the smaller number of 4d electrons in this metal. The band of pure zirconium (anode prepared from 99.99% zirconium iodide) was recorded with a resolution of 0.2 eV and an anode temperature of about 1000°C (C, O and N contamination less than 0.1%). The only perceptible structure was a weak line on the short wavelength side of the edge, similar to the lines reported the previous paper for Nb and Mo. The width of the M_V level was calculated from that of the short wavelength edge, but the result was lost in the corrections for instrumental broadening and temperature smearing of the Fermi surface, the final result being 0.04 ± 0.05 eV. The width of the 5s-4d band was obtained from the width of the M emission band, the long wavelength tail being eliminated by linear extrapolation. A value of 4.8 eV was found. The intensities of the lines of the M spectrum were measured relatively to M_ζ and they are tabulated for all three metals. An error is noted in the Nb and Mo line intensities as tabulated in the previous paper.

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ACCESSION NR: AP4038775

The intensity ratios (intensities relative to M_ζ) of M_{IV},V-Y_{VI} lines of Mo, Nb and Zr were, within the 20% experimental error, equal to the ratios 5:4:2 of the numbers of 4d electrons in the respective atoms. It is concluded that the M emission bands image the p and f states in the 4d bands, and characterize their widths and shapes. Orig.art.has: 4 figures and 3 tables.

ASSOCIATION: none

SUBMITTED: 00	DATE ACQ: 12Jun64	ENCL: 00
SUB CODE: OP	NR REF SOV: 003	OTHER: 000

Card 3/3

ACCESSION NR: AP4038776 S/0048/64/028/005/0841/0852

AUTHOR: Lukirskiy, A.P.; Bry*tov, I.A.

TTTLE: L Emission spectra of titanium, titanium dioxide, chromium and chromic oxide /Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sep to 1 Oct 1963/

SOURCE: AN SSSR. Izvestiya. Seriay fizicheskaya, v.28, no.5, 1964, 841-852

TOPIC TAGS: x-ray spectrum, x-ray emission, titanium, titanium oxide, chromium, chromium oxide

ABSTRACT: The L emission spectra of Ti and Cr were recorded by means of a diffraction grating spectrometer described elsewhere (A.P.Lukirskiy, Izv.AN SSSR,Ser.fiz. 25,913,1961). The spectrometer was calibrated (first order accuracy, 0.1 Å) with reference to oxgyen and nitrogen lines. The wavelength variation of the luminosity was examined with tungsten bremmstrahlung, and the relative line intensities were corrected accordingly. In addition to the spectra of the metals, the spectra of their oxides were recorded to provide intensity calibration for estimating the oxygen contamination of the anodes. The oxide spectra could not be obtained in high resolution

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ACCESSION NR: AP4038776

because of low intensity, and they are not discussed in detail. The anodes were heated by electron bombardment to the onset of vaporization and were then held for some time at a somewhat lower temperature. The final spectra showed slight oxygen and carbon contamination, but no nitrogen nor other contaminants were perceived. The contamination was less than 5% (considerably less in the case of Ti) and the anodes are regarded as sufficiently pure. The spectra of the metals and their oxides were recorded in the first order with a resolution of 0.08 Å. In addition, the Ti spectrum was recorded in the fourth order with a resolution of 0.02 Å and the Cr spectrum was recorded again in the first order but with a narrow slit that afforded a resolution of 0.04 Å. The relative intensities of the lines were measured and the results are tabulated. The widths of the L_ζ lines were measured and corrected for instrumental broadening. A previously unreported weak broad line was observed on the long wavelength side of L_ζ in each metal; it is designated $L_{\zeta'}$. This line is tentatively ascribed to a L_{III}-M_I transition with the simultaneous excitation of a plasmon, since its separation from L_ζ (about 20 eV in both metals) corresponds, according to J.L.Robbins and J.B.Swan (Proc.Phys.Soc.76,857,1960), to a prominent maximum in the electron loss for both metals. The width of the 4s-3d band was determined from the width of the L_{III} emission. For this purpose the long wavelength tail was eliminated by linear extrapolation since the $E^{1/2}$ law did not fit the data. The

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ACCESSION NR: AP4038776

width obtained for the Cr 4s-3d band agreed with the results of H.W.B.Skinner, T.G. Bullen and J.E.Johnston (Philos.Mag.45,1070,1954) and V.V.Nemoshkalenko (Doklad.AN SSSR 148,78,1963), but the Ti 4s-3d band was found to be considerably narrower. This result may be due to the linear extrapolation; it is also possible that the spectrum was that of the β-phase rather than the α-phase, for the anode temperature exceeded the transition temperature. The $I\beta_1/I\alpha_{1,2}$ intensity ratio in both Ti and Cr agreed with the findings of Skinner et al.(loc.cit.), and not with those of J.E. Holliday (J.Appl.Phys.33,3259,1962), although the anodes were prepared similarly to Holliday's. The L_η/L_ι intensity ratio did not agree with the $I\beta_1/I\alpha_{1,2}$ ratio. The discrepancy is ascribed to $L_{II}\rightarrow L_{III}M_{IV,V}$ Auger transitions. The $I\alpha_{1,2}/L_\iota$ intensity ratio was measured for the oxides, and it is discussed briefly. This ratio is sensitive to the chemical bonding. Orig.art.has: 3 formulas, 6 figures and 3 tables.

ASSOCIATION: Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta (Physics Department, Leningrad State University)

SUBMITTED: 00	DATE ACQ: 12Jun64	ENCL: 00
SUB CODE: OP	NR REF SOV: 006	OTHER:004

Card 3/3

S/0048/64/028/005/0866/0871

ACCESSION NR: AP4038780

AUTHOR: Lukirskiy,A.P.; Savinov,Ye.P.; Bry*tov,I.A.; Shepelev,Yu.F.

TITLE: Efficiency of secondary electron multipliers with Au, LiF, MgF_2, SrF_2, BeO, KCl and CsI photocathodes in the 23.6 to 113 Angstrom region /Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sep to 1 Oct 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.5, 1964, 866-871

TOPIC TAGS: x-ray detection, radiation detector, electron multiplier, photocathode, photocathode efficiency

ABSTRACT: The quantum efficiency of Au, LiF, MgF_2, SrF_2, BeO, KCl and CsI photocathodes were measured in secondary electron multipliers throughout the ultrasoft x-ray region from 23.6 to 113 A and at grazing angles from 4° to 40° (angles of incidence from 50° to 86°). An absolute accuracy of 15% is claimed for the measurements, and the data presented (except those for the BeO photocathodes, which were not reproducible) are recommended for absolute x-ray intensity measurements to this accuracy. The gold photocathodes were included for comparison, and the other materials were selected as the most efficient photocathodes that are not poisoned by air. The

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ACCESSION NR: AP4038780

LiF, MgF_2, SrF_2, KCl and CsI photocathodes were vacuum deposited on Al films on glass. The BeO photocathodes were prepared by oxidizing a film of Be, vacuum deposited on W or Mo. The BeO photocathodes prepared in this way were not reproducible, however, and only the data for the most efficient BeO photocathode are given. The thickness of the photocathodes was determined interferometrically. The thickness of the Au cathode was 1000 Å; that of the CsI cathode, 5500 Å; and the remaining photocathodes were 2500 Å thick. These thicknesses are greater than the depth from which the photoelectrons can emerge. Tungsten bremsstrahlung was employed for the measurements. The x-ray intensity was measured with an alcohol-argon Geiger counter and a methane proportional counter. The efficiencies of the counters were determined from absorption measurements, data of A.P.Lukirskiy and T.M.Zimkina (Izv.AN SSSR, Ser.fiz.27,104,1963) being employed for the alcohol-argon counter. Curves are presented showing the quantum efficiency of each photocathode at several selected wavelengths as a function of the grazing angle. Most of these curves have a rather sharp maximum at some small grazing angle and are otherwise smooth. Curves are also presented showing the quantum efficiency of each photocathode at 20° grazing angle as a function of the wavelength. These curves show marked fine structure near the absorption edges of the cathode materials but are reasonably smooth between. It is recommended that for any specific application a photocathode be selected for which the

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ACCESSION NR: AP4038780

fine structure lies outside the wavelength region of interest. Orig.art.has: 5 figures and 1 table.

ASSOCIATION: Fizicheskiy fakul'tet Leningradskogo gosudarstvennogo universiteta (Physics Department, Leningrad State University)

SUBMITTED: 00 DATE ACQ: 12Jun64 ENCL: 00

SUB CODE: OP,EC NR REF SOV: 010 OTHER: 000

Card 3/3

L 11428-65 EWT(1)/EWG(k)/EWT(m)/EPA(sp)-2/EFF(n)-2/EPR/EPA(w)-2/EEC(t)/T/
EWA/EWP(b) Pz-6/Pab-10/Ps-4/Pu-4 IJP(c) AT/JD/JG S/0181/64/006/011/3279/3287

ACCESSION NR: AP4048401

AUTHORS: Savinov, Ye. P.; Lukirskiy, A. P.; Shepelev, Yu. F.

TITLE: Concerning the external photoeffect of metallic photocathodes for radiation with wavelength 23.6--113 Angstrom

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3279-3287

TOPIC TAGS: x ray irradiation, photoeffect, secondary electron, angular distribution, aluminum, gold

ABSTRACT: The x-ray photoeffect was investigated in the ultrasoft region of the spectrum with an aim at determining the dependence of the quantum yield on the angle of incidence of the radiation on the photocathode, and at measuring the quantum yields of various substances. The monochromatic K_α lines of O, N, C, B, and Be and photocathodes of Al and Au were used. The procedure used to determine

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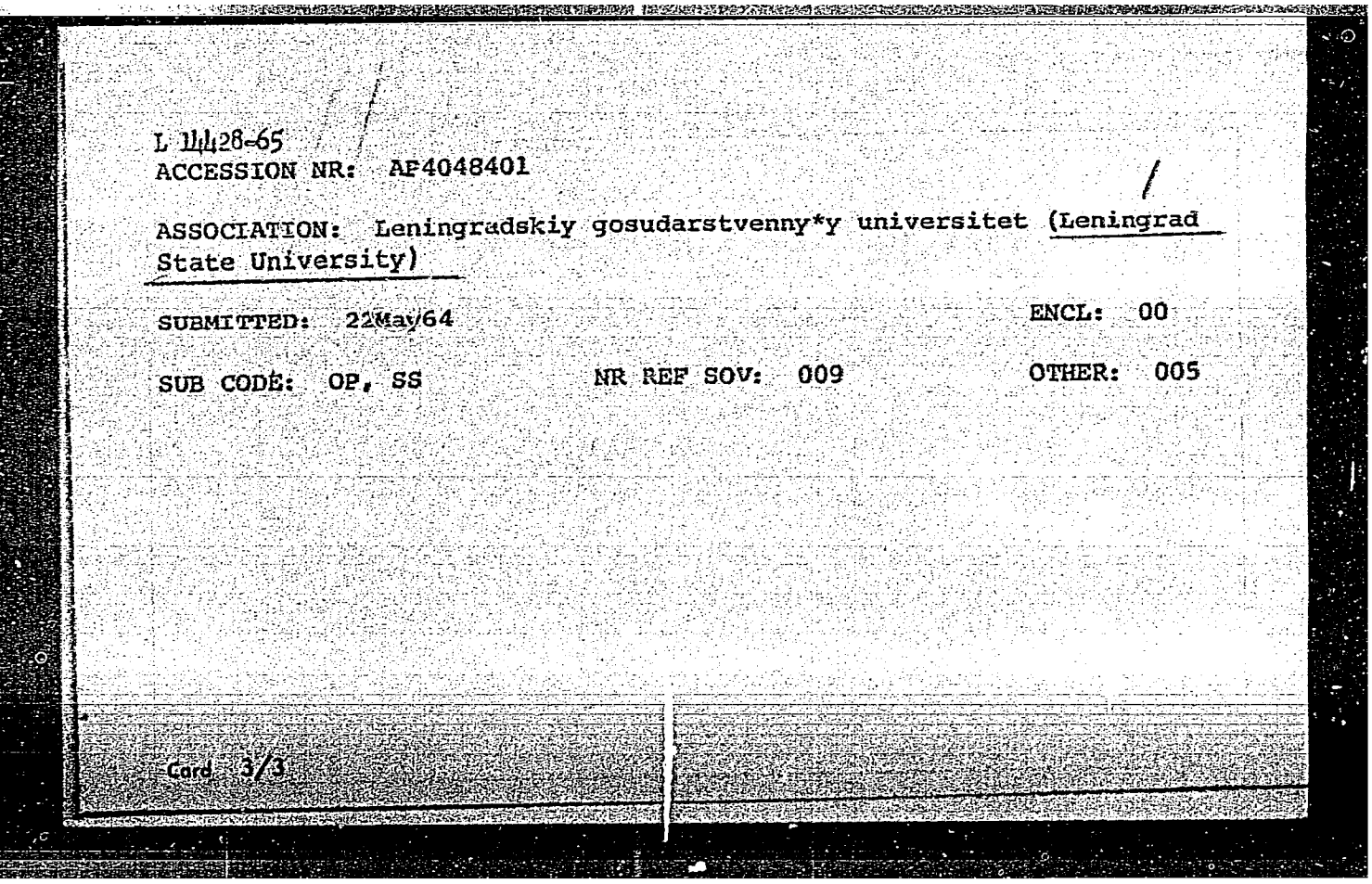
the absolute quantum yields was similar to that described by the authors elsewhere (Opt. is spektr. v. 9, 505, 1960), but using an improved proportional counter and a more careful choice of the supply voltage for the secondary electron multiplier. The monochromator employed was also similar to one previously used (Opt. i spektr. v. 13, 846, 1962). The experiments have shown that to describe the x-ray photoeffect it is essential to take account of the refraction of the beam in the photocathode, especially at small incidence angles, when reflection takes place. For ultrasoft x-rays, the electron flux attenuates exponentially almost in all cases, except at very small angles incidence, when the deviation from the exponential attenuation can be used to estimate the thickness of the layer from which electrons can be emitted without attenuation. These data agree well with those of H. Kanter and E. J. Sternglass (Phys. Rev. v. 126, 620, 1962). The formula derived for the quantum yield also agrees with the experimental results. Orig. art. has: 8 figures, 4 formulas, and 2 tables.



L 11428-65
ACCESSION NR: AP4048401

ASSOCIATION: Leningradskiy gosudarstvenny*y universitet (Leningrad State University)

SUBMITTED: 22May64 ENCL: 00

SUB CODE: OP, SS NR REF SOV: 009 OTHER: 005

Card 3/3

L 10874-65 EWT(m)/EPF(c)/EPR(n)-2/EPR/EWP(j)/EWP(b) Pc-4/Pr-4/Ps-4/Pu-4
RAEM(a)/AS(mp)-2/RAEM(i)/ASD(a)-5/ESD(gs)/ESD(t)/RAEM(t) JD/RM

ACCESSION NR: AP4044858 S/0051/64/017/003/0438/0445

AUTHOR: Lukirskiy, A. P.; Bry*tov, I. A.; Zimkina, T. M.

TITLE: Photoionization absorption of He, Kr, Xe, and methane in methylal in the wavelength range 23.6 to 250 Angstrom

SOURCE: Optika i spektroskopiya, v. 17, no. 3, 1964, 438-445

TOPIC TAGS: absorption coefficient, photoionization, bremsstrahlung, x-ray spectrum, helium, krypton, xenon, methane, methylal

ABSTRACT: The absorption coefficients were determined from the x-ray characteristics of the lines in the bremsstrahlung spectrum with an aim at checking the applicability of various theoretical calculations to the ultralong wave x-ray spectrum, and as a check on the correctness of the choice of the wave functions. The spectra of helium, xenon, krypton, and methane are of interest from the theoretical point of view and also in connection with their practical use in gas-discharge detectors. Methylal is of interest only for practical purposes. The procedure for determining the absorption in the gases was described elsewhere (Izv. AN SSSR ser. fiz. v. 27, 817, 1963). The experimental

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L 10674-65

ACCESSION NR: AP4044858

data for methane and helium were compared with the experimental data for the short-wave ultraviolet region of the spectrum and with the theoretical calculations. In the case of krypton and xenon, a complicated spectral variation of the absorption coefficient was observed, and the data were found to be comparable with those for neon and argon. It was found that all gases have the same structure of the external electron shell, and each displays a spectral dependence that becomes more complicated with increasing atomic number, and the 'anomalous' absorption extends into the short-wave section of the spectrum. Plots are given for the absorption coefficients of all gases. In the case of methane and methylal, the wavelength variation of the absorption coefficient (in a log-log scale) is linear, so that empirical expressions could be written for them. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: None

SUBMITTED: 14Aug63 ENC: 00

SUB CODE: OP NR REF SOV: 004 OTHER: 012

Card 2/2

L 20220-65 EPA(s)-2/EWT(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) Pr-4/Pt-10/Pu-4/Pa-4
IJP(c)/ASD(a)-5/SSD(c)/BSD/AFWL/ASD(m)-3/AS(mp)-2 PGC(b)/ESD(gs) JD/JG
ACCESSION NR: AP4038759 S/0048/64/028/005/0765/0771

AUTHOR: Lukirskiy, A.P.; Zimkina, T.M.

TITLE: L_{II} and L_{III} absorption spectra of potassium and chlorine in KCl [Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sept to 1 Oct. 1963]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.5, 1964, 765-771

TOPIC TAGS: x-ray absorption, x ray spectrum, photoemission, potassium, potassium compound, chlorine, chlorine inorganic compound, absorption spectrum

ABSTRACT: There have been numerous investigations of the K absorption spectra of KCl and their relation to the energy diagram of the crystal, but the interpretations of different authors differ as regards the origins of the fine structure peaks. The L absorption spectrum of KCl had not been studied hitherto; hence the purpose of the present work was to obtain the L spectrum and to investigate the quantum yield of the extrinsic photoeffect in the region of the absorption edges and to determine the widths of the L_{II} and L_{III} levels. The procedure was the same as described earlier (A.P.Lukirskiy and I.A.Brytov, Fizika tverdogo tela,6,43,1964). The absorbers for chlorine were prepared by vacuum evaporation of salt onto nitrocellulose

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films. Tests showed that the thickness and backing effects were nil. The absorbers for recording the potassium absorption were prepared on aluminum foil backings, owing to the fact that the C in nitrocellulose has an absorption edge in the investigated region. The recorded spectra are reproduced in figures. The energy value of the peaks and troughs in the L spectra of K and Cl are tabulated. Evaluations of the level widths indicate that the width of the L_{II} level lies in the range between 0.14 and 0.28 ev and that of the L_{III} level, between 0.02 and 0.095 ev, depending on whether the "phonon broadening" is or is not taken into account. The photoelectric spectrum was obtained from a photocathode prepared by vacuum evaporation onto an aluminum backing (layer thickness about 2500 Å). The results inferred from the photoelectric spectrum are consistent with the data deduced from the absorption spectrum. "The authors express their gratitude to N.N. Ivanchuk and to the students I.Zhukova and V.Fomichev who participated in processing the results." Orig.art.has: 3 formulas, 4 figures, and 1 table.

ASSOCIATION: Fizicheskiy fakultet Leningradskogo gosudarstvennogo universiteta (Physics Department, Leningrad State University)

SUBMITTED: 00 ENCL: 00

SUB CODE: OP, IC NO REF SOV: 009 OTHER: 004

L 20221-65 EWT(m)/EPF(c)/EPF(n)-2/EPR/EWP(t)/EWP(b) Pr-4/Ps-4/Pu-4 IJP(c)/
ACCESSION NR: AP4038760 ESD(gs) JD S/0048/64/028/005/0772/0779

AUTHOR: Lukirskiy, A.P.; Zimkina, T.M.; Brytov, I.A.

TITLE: Fine structure of the M absorption edges of krypton and the N absorption edges of xenon [Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sept to 1 Oct 1963]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.5, 1964, 772-779

TOPIC TAGS: x-ray absorption, x-ray spectrum, inert gas, xenon, krypton

ABSTRACT: Whereas the K absorption spectra of the inert gases have been extensively investigated and are susceptible of relatively simple interpretation based on comparison with the spectra of atoms (with Z one unit greater than that of the absorbing inert gas atom) and the L absorption spectra have also been studied and can be interpreted in similar fashion, the M and N absorption spectra have not been investigated (there is reason to assume, however, that their interpretation and calculation should be similar, but taking into account the high values of the effective quantum numbers). Accordingly, the present work was concerned with investigation of the N absorption spectrum of xenon and the M spectrum of krypton. The experimental

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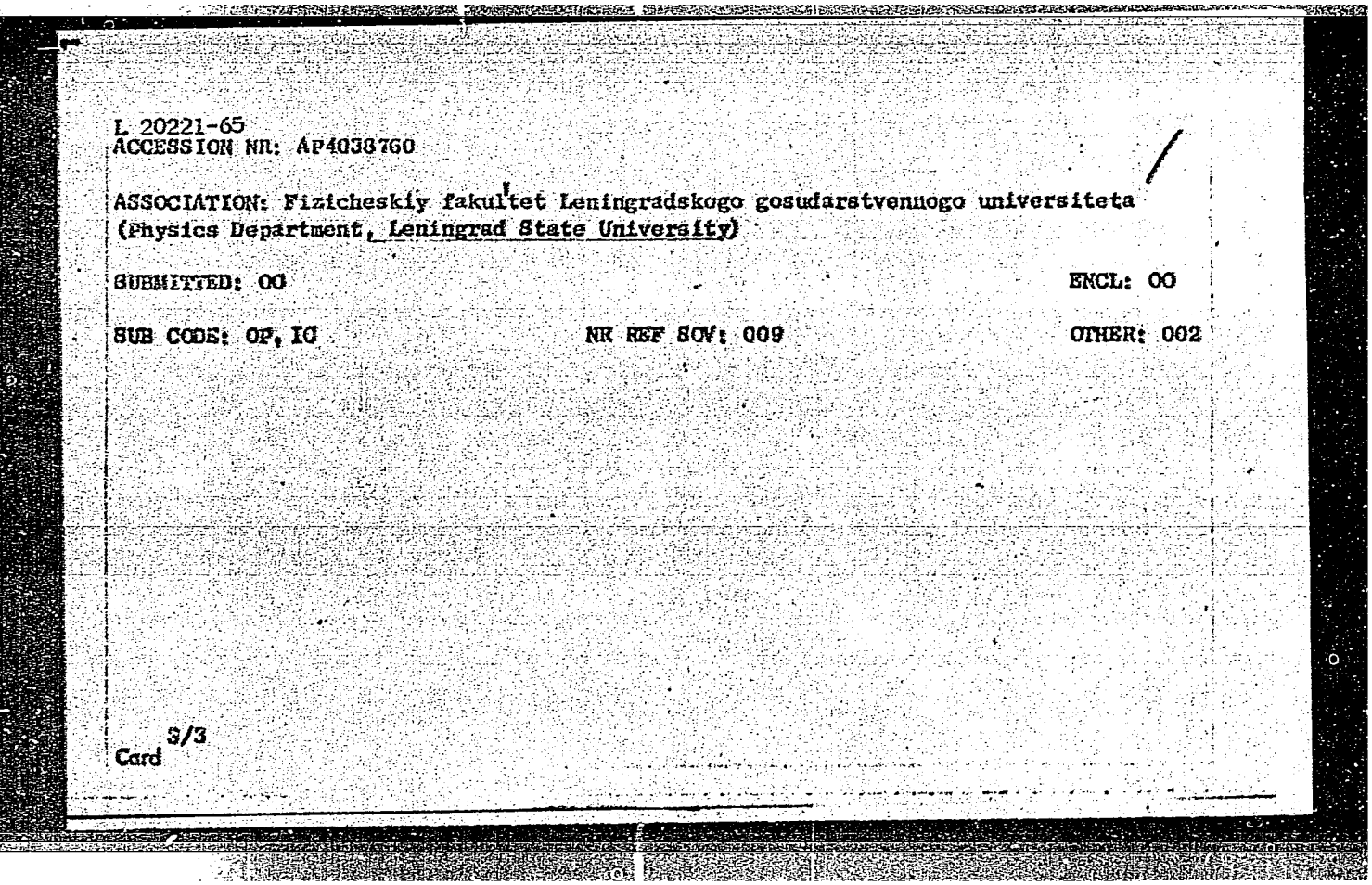
L 20221-65
ACCESSION NR: AP4038760

procedure was similar to that described earlier (A.P.Lukirskiy and T.M.Zimkina, Izv. AN SSSR, Ser.fiz.27,325,1963), except that the absorption was measured by the transmission method. Preliminary measurements were made at different pressures of the gas in the cell for different wavelength ranges, but for the final, detailed investigation there was chosen in each case the optimum pressure for obtaining the best contrast of the fine structure. The radiation was recorded by means of a Geiger counter, employing automatic recording. There were obtained the following values for the absorption discontinuities S: Kr M_{IV} & M_V and Xe N_{IV} & N_V - 1.6 ± 0.15; Xe N_{III} - 1.23 ± 0.03. The other edges were not observed, apparently, owing to the fact that with an increase in the azimuthal quantum number of the shell the magnitude of the jump decreases and the natural level width increases. The recorded absorption spectra in the regions of the respective edges are reproduced in figures, and the results of interpretation on the basis of the hydrogen-like model are tabulated. It is inferred that the natural level widths increase with a decrease in the azimuthal quantum number. In the N_{III}, N_{IV} and N_V spectra of Xe and the M_{IV} and M_V spectra of Kr the probability for $l \rightarrow l-1$ transitions appears to be substantially higher than the probability for $l \rightarrow l+1$ transitions. Orig.art.has: 3 figures and 1 table.

Card 2/3



L 20221-65
ACCESSION NR: AP4038760

ASSOCIATION: Fizicheskiy fakultet Leningradskogo gosudarstvennogo universiteta
(Physics Department, Leningrad State University)

SUBMITTED: 00 ENCL: 00

SUB CODE: OP, IC NR REF SOV: 009 OTHER: 002

Card 3/3

LUKIRSKIY, A.P.; BRYTOV, I.A.; ZIMKINA, T.M.

Photoionization absorption of He, Kr, Xe, CH_4 and methylal in the 23.0--250Å wavelength range. Opt. i spektr. 17 no.3:438-445 S '64. (MIRA 17:10)

SAVINOV, Ye.P.; LUKIRSKIY, A.P.; SHEPELEV, Yu.F.

Extrinsic photoeffect in metal photocathodes for emission at wavelengths of 23.6--113 Å. Fiz. tver. tela 6 no.11:3279-3287 N '64. (MIRA 18:1)

1. Leningradskiy gosudarstvennyy universitet.

L 00769-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b) IJP(c) JD/JG/GG
ACCESSION NR: AP5012557 UR/0181/65/007/005/1455/1461

AUTHOR: Zimkina, T. M.; Lukirskiy, A. P.

TITLE: Photoionization absorption in alkali-halide crystals in the 23--190 Å region

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1455-1461

TOPIC TAGS: alkali halide, photoionization, absorption coefficient, ionic crystal, electron shell

ABSTRACT: The purpose of the work was to obtain the spectral dependence of the absorption coefficient of ionic crystals and to trace, by comparison with the absorption spectra of inert gases, the influence of the field of the crystal on the character of absorption by ions which have the same electron configuration as the inert-gas atoms. To this end, a study was made of the spectral variation of the absorption coefficients of the ionic crystals KCl, KI, RbCl, RbBr, RbI, CsCl, CsBr, and CsI in the wavelength region from 23.6 to 190.3 Å. The investigations were made with a vacuum spectrometer using the monochromatic emission lines of O, N, C, Mo, Nd, Zr, Y, Sr, Rb, Ba, and Cs. The samples were thin polycrystalline layers deposited by vacuum evaporation on nitrocellulose substrates. The intensity was measured with a proportional counter, with the count at the maximum of the line amounting to 10^4--10^3 pulses per second. The results show that the general spectral variation of the absorption coefficients of the investigated crystals coincides

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L 00769-66

ACCESSION NR: AP5012257

fully with that of the absorption coefficients of the corresponding inert gases. For ionic crystals in which the anions and cations have different electron configurations, the spectral curve can be represented as a superposition of two curves corresponding to inert gases whose electron configurations are analogous to the configurations of the anion and the cation. A hypothesis is advanced that the crystal lattice has little influence on the localized wave functions of the shell that follows the outer electron shell of the ions, or on the wave functions of the electrons of the continuous spectrum near the ionic core. "The authors thank I. V. Abarenkov for a discussion of the results and S. A. Gribovskiy for help with the experiment." Orig. art. has: 1 figure, 2 formulas, and 2 tables.

ASSOCIATION: Leningradskiy gosudarstvenny universitet (Leningrad State University)

SUBMITTED: 08Dec64 ENCL: 00 SUB CODE: SS, OP

NR REF SOV: 006 OTHER: 001

Card 2/2

L 00768-66 EWT(1)/T IJP(c) GG

ACCESSION NR: AP5012558 UR/0181/65/007/005/1462/1466

AUTHOR: Zimkina, T. M.; Lukirskiy, A. P.

TITLE: Line structure of L_{III-II} absorption spectra of Cl in the compunds LiCl, NaCl, KCl, RbCl, and CsCl

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1462-1466

TOPIC TAGS: chlorine compound, absorption spectrum, absorption edge, fine structure, line spectrum

ABSTRACT: In this continuation of earlier work by the authors (Izv. AN SSSR ser. fiz. v. 28, 765, 1964) the study of the absorption spectra of Cl is extended to include a larger number of compounds. The procedure for obtaining and recording the spectra was the same as before. The spectra were measured in the 199--230 eV range. All curves displayed two fine-structure sections, one with the most pronounced maxima for all crystals having a lattice of the NaCl type amounting to ~8 eV, and the other beginning with a sharp increase in the absorption coefficient containing broader maxima. The hypothesis advanced in the earlier paper, that the bottom of the conduction band corresponds to the middle of the second rise in the curves while the first section of the fine structure is due to exciton absorption, is discussed in light of the new results. It is suggested that the L_{II} edge of absorp-

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L 00768-66

ACCESSION NR: AP5012558

tion of Cl is not clearly manifest in the obtained spectra, and that the entire fine structure is due to the absorption at the L_{III} level of Cl. "The authors thank S. A. Gribovskiy for help with the reduction of the experimental data." Orig. art. has: 1 figure and 3 tables.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: 08Dec64 ENCL: 00 SUB CODE: OP

NR REF SOV: 003 OTHER: 002

Card 2/2

L 6458-66 EWA(k)/EWT(m)/EWP(i)/EWP(b)/EWT(l)/EWP(e) LHB/WH
ACCESSION NR: AP5019848 UR/0181/65/007/008/2355/2361

AUTHOR: Yershov, O. A.; Goganov, D. A.; Lukirskiy, A. P.

TITLE: Investigation of x-ray spectra of silicon in crystalline viterous quartz and lithium silicate glasses

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2355-2361

TOPIC TAGS: silicate glass, lithium glass, quartz, silicon, x ray diffraction study, diffraction grating, absorption spectrum, emission spectrum

ABSTRACT: The authors investigated the $L_{II, III}$ emission and absorption spectra of silicon in quartz and glass for the purpose of determining the relative changes in the state densities and estimating the bandwidths in these solids. The measurements were made with a diffraction-grating spectrometer with sufficiently high resolution (~0.2 ev), described by one of the authors earlier (Lukirskiy, Izv. AN SSSR ser. fiz. v. 25, 913, 1961). The width of the filled states of Si in SiO_2 was found to be 12.5 ± 0.5 ev. The details of the absorption and reflection spectra of the quartz and the lithium-silicate glasses are determined. The tests have shown that both the emission and the absorption spectra coinicide. It is concluded from the rest that the occupied band, the forbidden band, and the conduction band of Si have the same shape and positions, and consequently are determined

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L 6458-66
ACCESSION NR: AP5019848

6

by the short-range order of the surrounding of the Si atom (one coordination sphere). The values obtained for the occupied and forbidden bands are 12.5 ± 0.5 and 7 ± 0.5. The fact that the extensive fine structure of the absorption spectra coincides for the investigated substances indicates that the absorption fine structure is governed essentially by the first coordination sphere of silicon. This deduction agrees with the short-range order theory. "The authors thank A. A. Petrov for help in preparing the samples." Orig. art. has: 5 figures and 2 tables.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: SS, OP

NR REF SOV: 005 OTHER: 006

nw

Card 2/2

L 28038-66 EWA(h)/EWT(m)/T IJP(c)

ACC NR: AP5027008 SOURCE CODE: UR/0120/65/000/005/0066/0070

AUTHOR: Lukirskiy, A. P. (Deceased); Brytov, I. A.

ORG: Leningrad State University (Leningradskiy gosudarstvennyy universitet)

TITLE: The use of gas-filled counters for measurements of ultra-soft X-rays

SOURCE: Pribory i tekhnika eksperimenta, no. 5, 1965, 66-70

TOPIC TAGS: x ray, x ray measurement, Geiger counter, proportional counter, gas discharge counter

ABSTRACT: The use of Geiger and proportional counters for measuring X-rays of 23.6 to 200 angstrom is discussed. The discussion is based on the results and data already published. The use of very thin counter windows made of nitrocellulose is recommended on the basis of the preceding research. The properties of nitrocellulose window (soft X-ray passage and absorption) were graphically characterized. It was also recommended to use counters with a low gas pressure. Thus, a careful selection of appropriate gases or their mixtures is required to ensure a good counter performance. The performance effectiveness of gas filled

Card 1/2 UDC: 539.1.074.23:537.531

L 28038-66

ACC NR: AP5027008

counters is explained with numerous references to the author's preceding investigations. Formulas were cited and absorption factors for nitrocellulose windows and various gases were presented. The operating characteristics of argon-alcohol and argon-methane Geiger counters were briefly reviewed. The argon-alcohol counters have a better plateau and work well even at a pressure of 10 tor. However, Geiger counters have a long dead time reaching 5 x 10^{-4} sec. The proportional counters with methane and argon-methane fillings were also reviewed. Their gas-amplification factor must be rather high in case of ultra-soft X-rays. Various factor values (from 5.10^3 to 3.10^5) were mentioned. The plateau lengths and gas-amplification factors were graphically shown as function of applied voltage for various pressures of methane gas. It was recommended to use methane counters at pressures greater than 60 tor and for wave lengths less than 150 angstrom. The proportional counters filled with methylal were also studied and their plateau lengths and gas-amplification factors were graphically illustrated. The results disclosed that the methylal filled proportional counters are particularly well suited to measure the entire range of ultra-soft X-rays. Orig. art. has: 4 graphs and 2 tables.

SUB CODE: 18 / SUBM DATE: 13July64 / ORIG REF: 006 / OTH REF: 001

Card 2/2

L 9915-66 EWT(l)/EWP(e)/EWT(m)/EWP(j)/EWP(h) LHB/RM/WH SOURCE CODE: UR/0051/65/019/003/0425/0433

ACC NR: AP5022867

AUTHOR: Lukirskiy, A. P. (Deceased); Savinov, Ye. P.; Yershov, O. A.; Zhukova, I. I.; Fomichev, V. A.

ORG: None

TITLE: Reflection of x rays with wavelengths from 23.6 to 190.3 Å. Some remarks on the operation of diffraction gratings

SOURCE: Optika i spektroskopiya, v. 19, no. 3, 1965, 425-433

TOPIC TAGS: x ray diffraction, x ray filter, x ray spectrum, diffraction grating

ABSTRACT: The authors measured the angular dependence of the reflection coefficient for various substances, using the following monochromatic lines: O_K (23.6 Å), N_K (31.4 Å), C_K (44 Å), B_K (67 Å), $Sr_{M\xi}$ (108.65 Å), $Rb_{M\xi}$ (128.66 Å), $Ba_{NV-OIII}$ (164.6 Å), and $Cs_{NV-OIII}$ (190.3 Å). The measurement methods were described by the authors elsewhere (Opt. i spektr. v. 16, 310, 1963 and earlier). For lines shorter than 113 Å the radiation was detected with a flow-through proportional counter filled with methane; for longer wavelengths a Geiger counter with argon-alcohol mixture was used. The substances measured were F-1 glass, gold, titanium, and polystyrene. The method of preparing the reflectors was also described in the earlier papers. Polystyrene and titanium reflectors are found to be capable of effectively filtering radiation shorter than 50--200 Å, depending on the angle of incidence. In the case of F-1 glass, a sharp fine structure is observed in the reflection coefficient at wavelengths 70--130 Å. For titanium the fine structure appears at wavelengths shorter

UDC: 537.531

Card 1/2

L 9915-66

ACC NR: AP5022867

than 30 Å, and for polystyrene at wavelengths shorter than 45 Å. Gold exhibits no fine structure. The spectral dependences of the reflection coefficients show that titanium mirrors can be used effectively as filters for radiation of wavelengths shorter than 30--50 Å at various angles of incidence, and that polystyrene mirrors can be used as filters for radiation shorter than 50--180 Å, depending on the angle of incidence. The maximum reflection coefficients in the first order of diffraction have been calculated also for echelettes cut in F-1 glass and echelettes with gold and titanium coatings, which were also studied by the authors earlier (Opt. i spektr. v. 14, 285, 1963). Plots of the maximum reflection coefficient of the echelettes (600 and 1200 lines/mm) vs. the angle make it possible to choose the optimum angles of incidence and the angles of inclination of the echelette steps. The greatest possible reflection coefficients are obtained in first order. Orig. art. has: 3 formulas and 1 table.

SUB CODE: 20/ 07/ 18/ SUBM DATE: 21May64/ ORIG REF: 007/ OTH REF: 001

Card 2/2

L 15973-66 EWT(1)/EWT(m)/EWP(t) IJP(c) JD/JG
ACC NR: AF5027674 SOURCE CODE: UR/0051/65/019/005/0800/0808

AUTHOR: Lukirskiy, A. P. (Deceased); Fomichev, V. A.

59
31

ORG: none

TITLE: Damping emission of the tungsten anode in the region of 25 - 250 A wave length

55, 27

SOURCE: Optika i spektroskopiya, v. 19, no. 5, 1965, 800-808

TOFIC TAGS: tungsten, absorption spectrum, spectral distribution, electrode

ABSTRACT: A method of measuring the relative intensities for a wide spectral range was investigated. The spectral distribution in the spectral region of 25 - 250 A of a tungsten anode was obtained corresponding to the 24 - 5 kv accelerating potentials. Such a damping emission could be used for an investigation of absorption spectrums with a high energy resolution. The distribution of the intensity in the damping spectrums of tungsten anodes for 70 - 120 v accelerating potentials was also investigated. A sharp structure was detected near the short-wave boundary of the spectrum. Orig. art. has: 10 figures and 4 formulas.

SUB CODE: 20 09/ SUBM DATE: 07Jul64/ ORIG REF: 008/ OTH REF: 006
UDC: 535.237 : 537.531

Card 1/1 bvk

2

L 17804-66 EWT(m)/EWP(j)/T RM

ACC NR: AP6007024 SOURCE CODE: UR/0051/66/020/002/0368/0369

AUTHOR: Lukirskiy, A. P.; Brytov, I. A.; Gribovskiy, S. A.

30
B

ORG: none

TITLE: Photoionizing absorption of Ar, Xe, alcohol, and dimethoxymethane in the 7—44 Å wavelength range

SOURCE: Optika i spektroskopiya, v. 20, no. 2, 1966, 368-369

TOPIC TAGS: x ray absorption, x ray absorption spectrum, absorption coefficient

ABSTRACT: The coefficients of photoionizing absorption of x-radiation in Ar, Xe, alcohol, and dimethoxymethane were measured. The coefficients for Ar in the spectral region from 8 to 23 Å may be found by extrapolation according to data from Lukirskiy and Zimkina (Izv. AN SSSR, ser. fiz. 27, 817, 1963) and Wuilleumier (C. R. Acad. Sci. 257, 855, 1963). For Xe the absorption coefficients were measured up to 23 Å from the long-wave side of the spectrum. The spectral range from 7 to 23 Å was not studied. For Xe the dependence of lg μ on lg λ was found to be nonlinear. Breaks were found in the experimental dependence of lg μ on lg λ which were attributed to absorption discontinuities. For dimethoxymethane and alcohol, the average values of the absorption discontinuities (the oxygen discontinuity S_{OK}) were 2.4 and 2.3, respectively. Both gases, apparently, have a region of fine Kronig structure from the short-wave side of the edge, although this structure on the bremsstrahlung

UDC: 535.34:537.531

Card 1/2

L 17804-66

ACC NR: AP6007024

spectrum was not investigated. Experimental values of absorption coefficients plotted on a logarithmic scale with regard to wavelength can be expressed as: for alcohol 8 Å < λ < 20 Å, $\mu = 0.004314 \cdot \lambda^{2.35}$; 23 Å < λ < 36 Å $\mu = 0.00412 \cdot \lambda^{2.55}$; for dimethoxymethane 7 Å < λ < 20 Å, $\mu = 0.0111 \cdot \lambda^{2.68}$; 24 Å < λ < 36 Å $\mu = 0.00102 \cdot \lambda^{2.4}$; where μ is in reciprocal centimeters, λ in angstroms for 0°C, and p = 760 mm Hg. [JA]
Orig. art. has: 1 figure and 1 table.

SUB CODE: 20/ SUBM DATE: 29Jun65/ OTH REF: 002/ ATD PRESS: 4211

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L 24282-66 EWT(m)/EWP(j)/EWA(h)/EWA(l) RM

ACC NR: AP6007023 SOURCE CODE: UR/0051/66/020/002/0366/0368

AUTHOR: Lukirskiy, A. P. (deceased); Fomichev, V. A.; Brytov, I. A.

ORG: none

TITLE: Absorption coefficients of nitrocellulose and polystyrene in the 8--410 Å region of the ultrasoft x-radiation

SOURCE: Optika i spektroskopiya, v. 20, no. 2, 1966, 366-368

TOPIC TAGS: absorption coefficient, polystyrene, nitrocellulose, radiation detector, x ray filter

ABSTRACT: This is a continuation of earlier work (Opt. i spektr. v. 17, 438, 1964) on the efficiency of gas-filled radiation detectors. Whereas the absorption coefficients of the gas and vapor used in these detectors were measured earlier, the nitrocellulose used for the detector window was not investigated before. The measurement procedure was the same as in the earlier work. The preparation of the transparent films is briefly described. Films close to optimal thickness for each wavelength were used. The numerical values of the absorption coefficients are listed in a table for the different wavelengths in the case of nitrocellulose and plotted in the case of polystyrene. In the case of polystyrene, a considerable jump occurs in the absorption coefficient in the vicinity of the carbon line and it is noted that polystyrene can serve because of this anomaly as an effective filter for ultrasoft x-radiation. Orig. art. has: 1 figure, 1 formula, and 1 table.

SUB CODE: 20/ SUBM DATE: 29Jun65/ ORIG REF: 003/ OTH REF: 003

UDC: 535.34: 537.351

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L 38893-66 EWT(l)/EWT(m)/EWP(j)/T/EWP(t)/ETI IJP(c) RDW/JD/RM

ACC NR: AP6018563 SOURCE CODE: UR/0181/66/008/006/1929/1931

AUTHOR: Lukirskiy, A. P. (deceased); Zimkina, T. M.; Gribovskiy, S. A.

ORG: Leningrad State University im. A. A. Zhdanov (Leningradskiy gosudarstvennyy universitet)

TITLE: Photoionization of d-electrons in Te, Sn, Pb, PbTe, and SnTe

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1929-1931

TOPIC TAGS: tellurium, tin, lead, lead compound, tin compound, telluride, photoionization, ionization cross section, absorption spectrum, electron energy, electron distribution

ABSTRACT: The authors investigated the absorption spectra of Te, Sn, Pb, PbTe, and SnTe in the energy range 50 - 500 ev, to check on the existence of extrema in these spectra due to the node character of the wave functions, and not to the energy distribution of the electron states. The absorption coefficient was measured by a procedure described elsewhere (FTT v. 7, 1455, 1963) on test samples consisting of thin films deposited on nitrocellulose substrates. In all substances except lead the spectral peaks observed near 80 ev are related to photoionization of 4d-electrons and are located on the high-energy side of the N_{IV}-N_V absorption edges, and the spectral dependence of the absorption coefficients from 50 to 500 ev agrees well in form with the experimental and theoretical energy dependence of the photoionization cross sections of the 4d-electrons of xenon. In the case of lead the peak lies lower than

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ACC NR: AP6018563

50 ev, owing to the lower value of the 5d-electron ionization potential. It is concluded as a result of a brief analysis that the maxima of the absorption spectra of the other four substances are not connected with their crystal structure but reflect the character of the 4d-electron absorption. The authors thank I. V. Abarenkov for a discussion of the results. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 14Dec65/ ORIG REF: 004/ OTH REF: 008

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L 41590-66 EWT(1)/EWI(m)/EWP(t)/ETI IJP(c) JD/JW/JG

ACC NR: AP6018540 SOURCE CODE: UR/0181/66/008/006/1787/1790

AUTHOR: Lukirskiy, A. P. (deceased); Yershov, O. A.; Zimkina, T. M.; Savinov, Ye. P.

ORG: Leningrad State University im. A. A. Zhdanov (Leningradskiy gosudarstvennyy universitet)

TITLE: Spectral dependences of the absorption, reflection, and photoemission coefficients of LiF in the range from 60 to 120 ev

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1787-1790

TOPIC TAGS: lithium fluoride, absorption coefficient, absorption edge, quantum yield, bremsstrahlung, x ray diffraction study, spectral distribution

ABSTRACT: In order to study the fine structure of the absorption edge, the authors measured the coefficients of absorption, reflection, and the quantum yield of LiF in the range 60 - 120 ev, which has not been thoroughly investigated in the past. The measurements were made with an x-ray spectrometer with diffraction grating using the bremsstrahlung spectrum of a tungsten anode. The apparatus and procedures for its use and for elimination of higher-order diffraction spectra were described elsewhere (Opt. i spektr. v. 19, 433, 1965 and earlier papers). The tested samples were thin polycrystalline LiF films deposited by vacuum evaporation on nitrocellulose substrates. Sharp fluctuations of the absorption coefficient, which exactly duplicate fluctuations in the spectral dependence of the quantum yield, were observed in the region of the absorption K edge of the lithium ion over a section extending from ~60 to ~80 ev. The

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ACC NR: AP6018540

large values of the quantum yield (more than 50%) and its correlation with the absorption coefficient indicate that the fundamental role in the photoemission near the absorption edge is played by Auger electrons. The spectral dependence of the reflection coefficient also displays a fine structure near the K edge, and agrees qualitatively with the fine structure of the absorption spectrum. However, no exact correlation is observed between the absorption and reflection coefficients, in view of the complicated relation between them via the refractive index. The authors thank A. M. Rumsh for a discussion of the results and S. A. Gribovskiy and N. N. Ivanchik for help with the reduction and presentation of the results. Orig. art. has: 1 figure and 1 table.

SUB CODE: 20/ SUBM DATE: 03Nov65/ ORIG REF: 008/ OTH REF: 006

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